New Program Proposal
B.S. in Applied Physics
Coastal Carolina University

Summary

Coastal Carolina University (CCU) requests approval to offer a program leading to the Bachelor of Science degree in Applied Physics, to be implemented in Fall 2005.

The proposal was approved by the Coastal Carolina University Board of Trustees on January 14, 2005, and submitted for Commission review on January 21, 2005. The proposal was reviewed without substantive comment and voted upon favorably by the Advisory Committee on Academic Programs at its meeting on March 7, 2005.

The purposes of the program are: to develop strong student competencies in physics and its applications in a technology-rich, interactive environment; to develop strong student skills in the research, analysis, and interpretation of complex information; and to prepare students to successfully compete for employment and/or to pursue graduate study. The proposed degree will have two emphases. The "traditional" emphasis will focus on applied physics in fields such as computer interfacing and electro-optics, and may lead to further study in engineering. The "environmental" emphasis incorporates the fundamentals of physics as they are applied to atmospheric sciences, oceanography, and geographic (remote sensing) information systems. It should be noted that CCU currently offers a minor in physics. As a result, many of the essential elements of the proposed major in Applied Physics have already been established at the institution.

The proposal presents four arguments that underscore the need for the program. First, other highly-regarded liberal arts institutions across the nation have a physics major that anchors their science program. Thus, the overall science program at CCU, although strong in offering biology, chemistry, mathematics, and physics courses, is at a competitive disadvantage in not offering a physics major. Second, South Carolina continues to maintain a shortage of highly-qualified public school teachers in the physical sciences, and the proposed program would extend CCU's capacity to train these individuals for secondary school assignments. Third, the delivery of a physics major is responsive to current statewide efforts to attract and retain technology-based companies. Program graduates will be

immediately employable in several local companies engaged in the development and delivery of technology goods and services. Finally, the proposed program is needed to support CCU's agreement with Clemson to offer a 3+2 program, where students attend CCU for three years and Clemson for two years, earning both a Bachelor's degree from CCU in their specialized discipline and an engineering degree from Clemson.

The proposal notes that although there are Physics programs offered by other South Carolina institutions (Charleston Southern University, The Citadel, Columbia College, Converse College, Lander University, Francis Marion University, Presbyterian College, South Carolina State University, USC-Upstate, and Wofford College), the proposed program is unique in offering students the option of emphasizing "traditional" or "environmental" Applied Physics in developing their course of study. There are several sub-fields within the area of Physics. For example, theorists seek to develop theories that can explain existing experimental results and successfully predict future results. In contrast, Applied Physics seeks to apply the knowledge of theoretical physics to real-world situations and to craft practical solutions that meet the needs of society.

Physics, along with biology and chemistry, remains one of the core science disciplines for undergraduate study. At present among public institutions within South Carolina, all undergraduate programs in Physics have met CHE productivity standards except for South Carolina State University, which is in provisional approval status.

There is no recognized accrediting agency for Physics or Applied Physics. Physics is the science of matter and energy and their interactions.

The proposal notes that CCU currently offers a minor in Physics, with five students enrolled and an additional five indicating a desire to declare a minor. Total enrollment for the first year is expected to be ten students, with seven of the ten representing first time enrollees. Enrollment projections remain constant through year two, with a slight increase of one additional student in year three, and then constant through year five of the program. CCU anticipates attracting additional students from the 3+2 engineering program with Clemson, as well as students interested in Mechanical, Civil, Electrical, Industrial, and Materials Engineering. Based on this pool of potential applicants, CCU estimates that the Applied Physics major, once implemented, will graduate between five and ten students annually. This is considerable, given that the national average of program graduates in Physics departments is less than one. If CCU is able to achieve these enrollment and graduation projections, they will meet CHE program productivity standards.

The proposed program will consist of 120 semester hours, including: 46-52 semester hours in core curriculum courses; 38 semester hours in required physics major courses; 25 semester hours in foundational courses; and 5-11 semester hours in non-major electives. Three new courses associated with the program include: Physics 340 Intermediate Astronomy; Physics 410 Optics; and Physics 420 Solid State Physics.

No new faculty or support staff will be required for the initial phase of the program, although additional faculty may be needed if enrollment growth is larger than anticipated. Currently, five full-time faculty service the Physics minor, and it is anticipated that the same five faculty will provide instruction for the Physics major. Current faculty include two professors at the rank of Associate, two at the rank of Assistant, and one Instructor. All faculty members have a terminal degree and are teaching within respective fields of training.

The proposal describes CCU's current research laboratory facilities and computer technology resources. The proposal also identifies additional supplies and equipment costs for the proposed program in the amount of $15,000 for each of the first five years, totaling $75,000 by the end of year five.

The proposal also anticipates a need to expand library holdings, due to topic-specific shortcomings relative to peer institutions offering similar programs. Based on comparisons with South Carolina peer institutions offering a course of study in Physics, CCU's Kimbel Library offers 23 fewer Physics-related titles per FTE student. The proposal estimates the cost of library materials to be $7,696 for each of the first five years of the program, totaling $38,480 by the end of year five.

New costs for the program are estimated to begin at $22,696 in each of the first five years. Categories of costs over the first five years of the program's implementation include equipment ($50,000); library resources ($38,480); and supplies and material ($25,000). Total estimated new costs for the program during the first five years will be $113,480.

Shown below are the estimated Mission Resource Requirement (MRR) costs to the state and new costs not funded by the MRR associated with implementation of the proposed program for its first five years. Also shown are the estimated revenues projected under the MRR and the Resource Allocation Plan as well as student tuition.

Year	Estimated MRR Cost for Proposed Program	Extraordinary (Non-MRR) Costs for Proposed Program	**Total Costs**	State Appropriation	Tuition	**Total Revenue**
2004-05	$122,866	**$0**	**$122,866**	$0	$101,157	**$101,157**
2005-06	$122,866	**$0**	**$122,866**	20,976	$101,157	**$122,133**
2006-07	$133,550	**$0**	**$133,550**	20,976	$109,419	**$130,395**
2007-08	$133,550	**$0**	**$133,550**	22,897	$109,419	**$132,316**
2008-09	$138,892	**$0**	**$138,892**	22,897	$114,318	**$137,215**

These data demonstrate that if the institution meets the projected student enrollments and contains costs as they are shown in the proposal, the program will come very close to covering costs beginning in the second year of the program.

In summary, Coastal Carolina University proposes to offer a program of study leading to the Bachelor of Science degree in Applied Physics. The program offers both "traditional" and "environmental" emphases in the application of physics, thus presenting a unique course of study while meeting the increasingly diverse needs of an expanding technology-based economy.

Recommendation

The Committee on Academic Affairs and Licensing recommends that the Commission approve Coastal Carolina University's program leading to the Bachelor of Science in Applied Physics program to be implemented in Fall 2005, provided that no additional "unique cost" or other special state funding be required or requested.